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(52) UK CL (Edition P)

H4J JK J36Q

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US 5465401 A US 5331123 A

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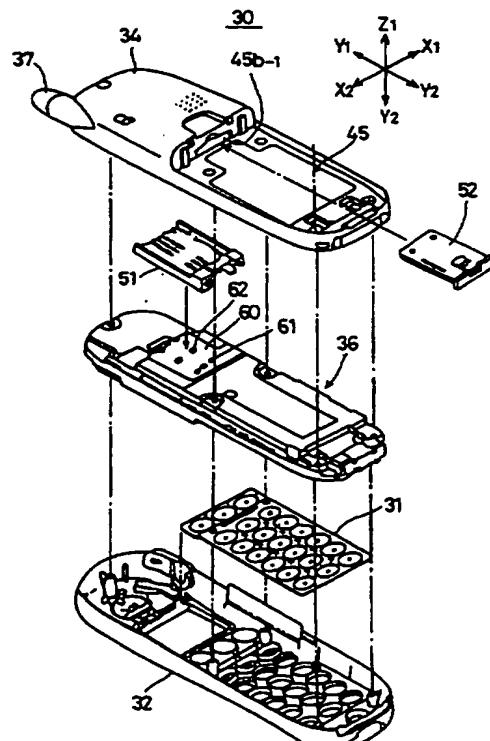
INT CL<sup>6</sup> H04B 1/034 1/08 1/38, H04M 1/02 1/72

(54) Abstract Title

Portable telephone set with a card loading portion and battery housing side by side

(57) A portable telephone set 30 includes a case 32,34 and a card loading mechanism 51,52. The case has first and second sides 32 and 34 opposite to each other. A group of keys 31 is located on the first side of the case. The case includes first and second portions 45 and 45b-1 located on the second side. The first portion 45 can accommodate a battery pack and the second portion is next to the first portion and accommodates the card loading mechanism. A card in which information is stored can be loaded into the card loading mechanism and held by a spring mechanism. Also provided is a detection switch (figures 8 and 15) to detect if the card is present in the card holder. The detection switch has a terminal which is sprung to engage with the card in the card holder.

FIG. 3



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FIG. 1A PRIOR ART

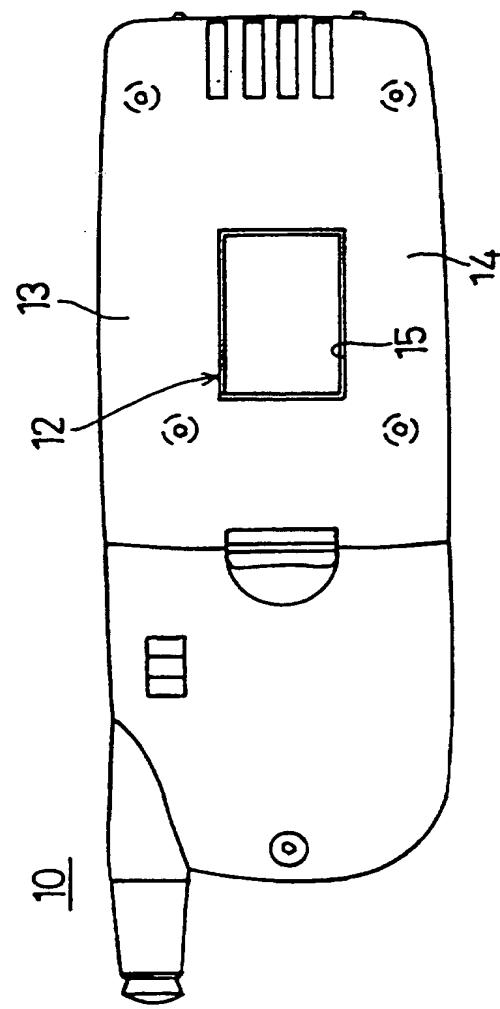


FIG. 1B PRIOR ART

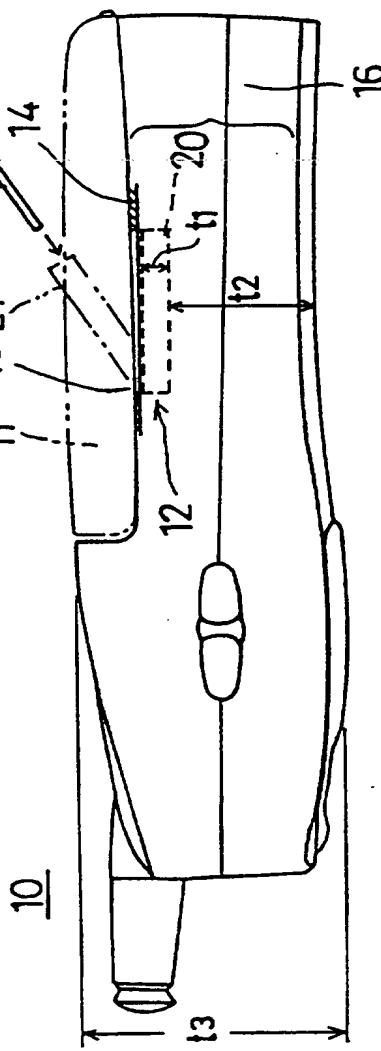


FIG. 2A

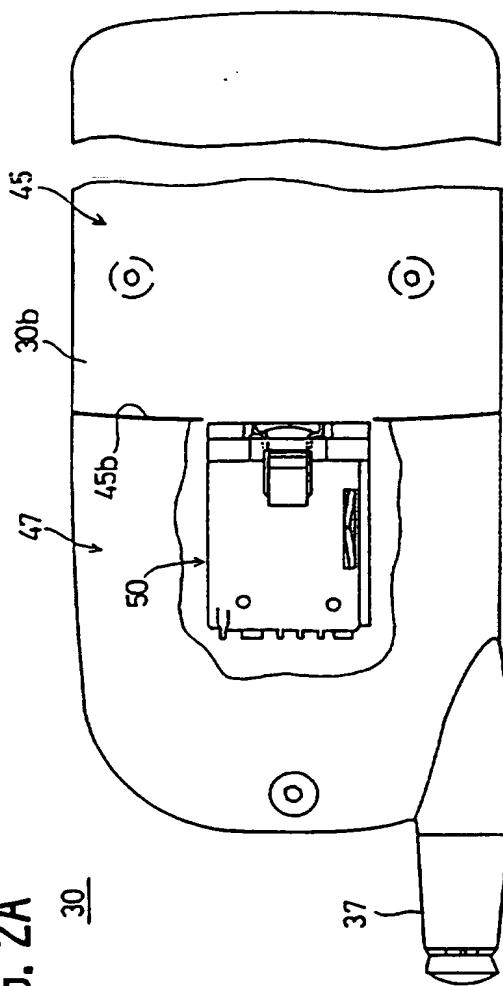


FIG. 2B

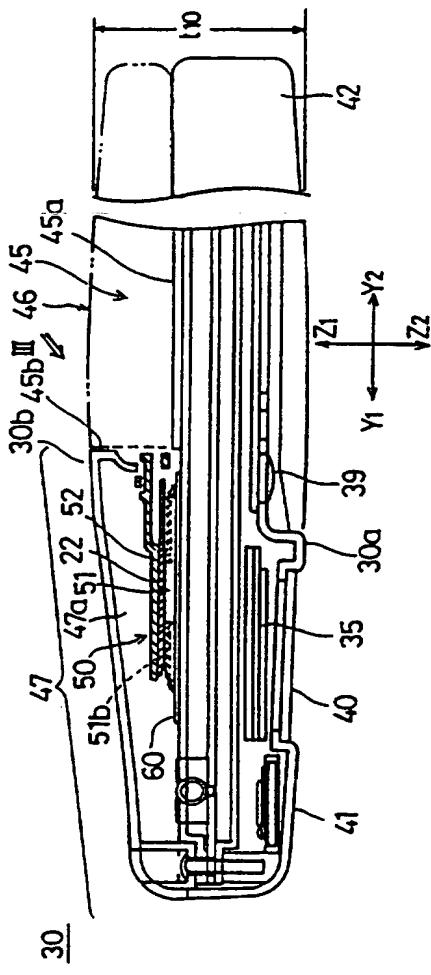


FIG. 3

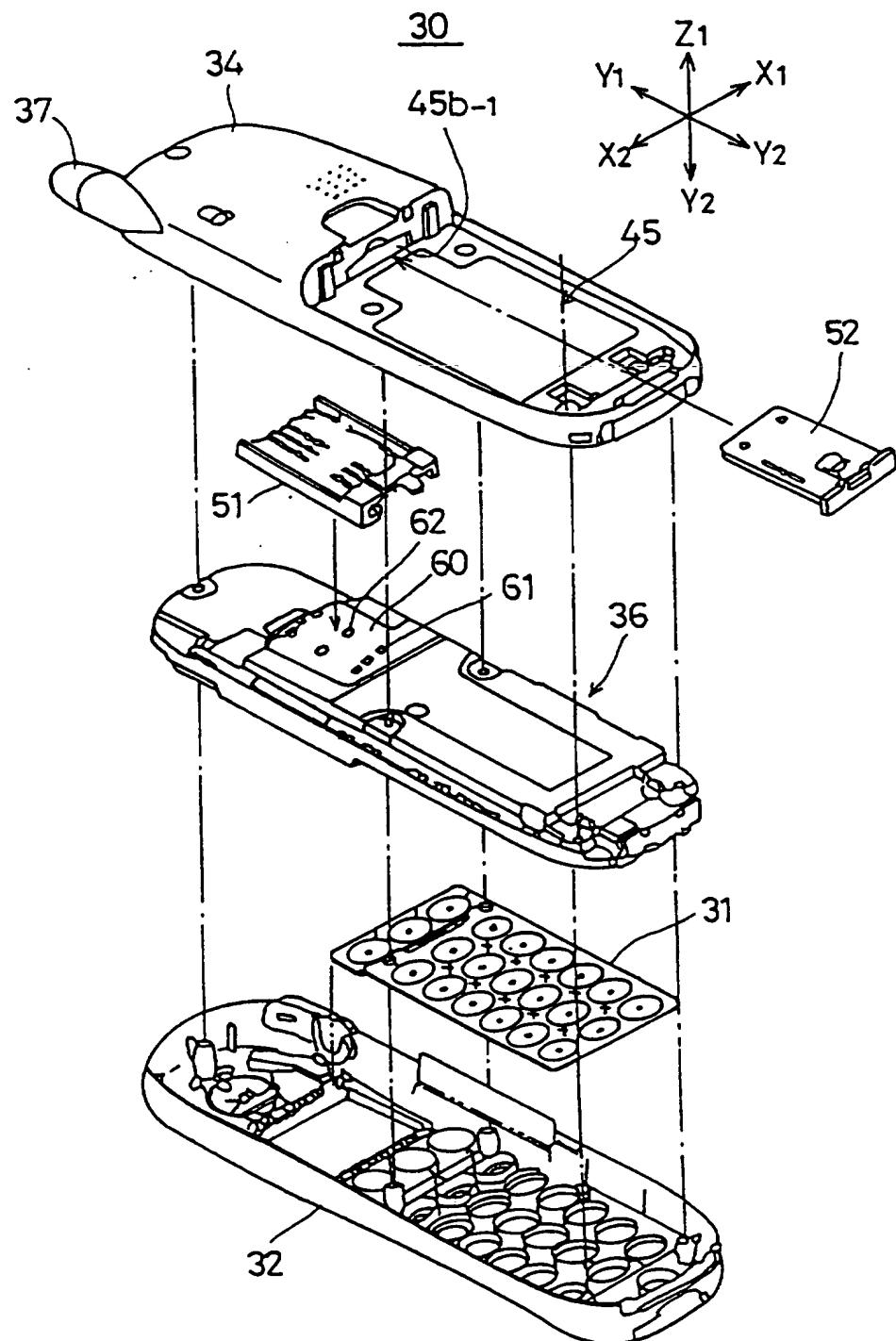


FIG. 4

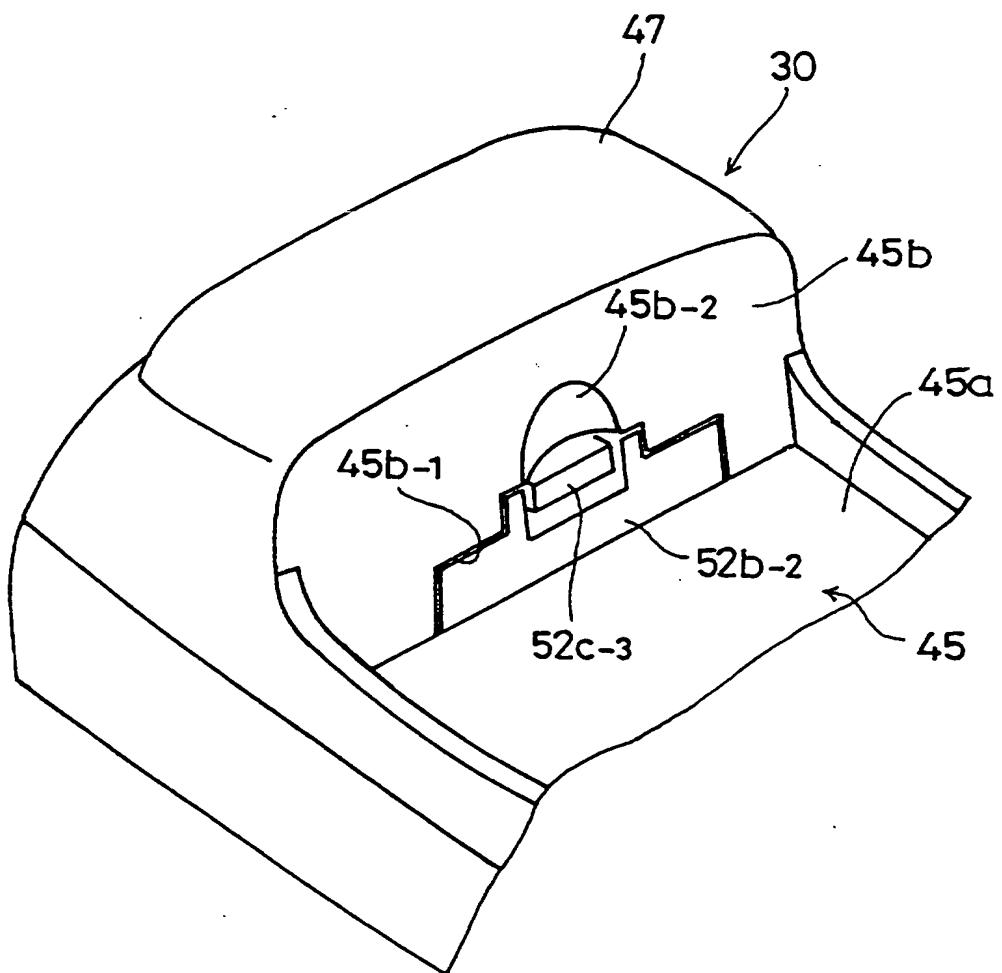


FIG. 5

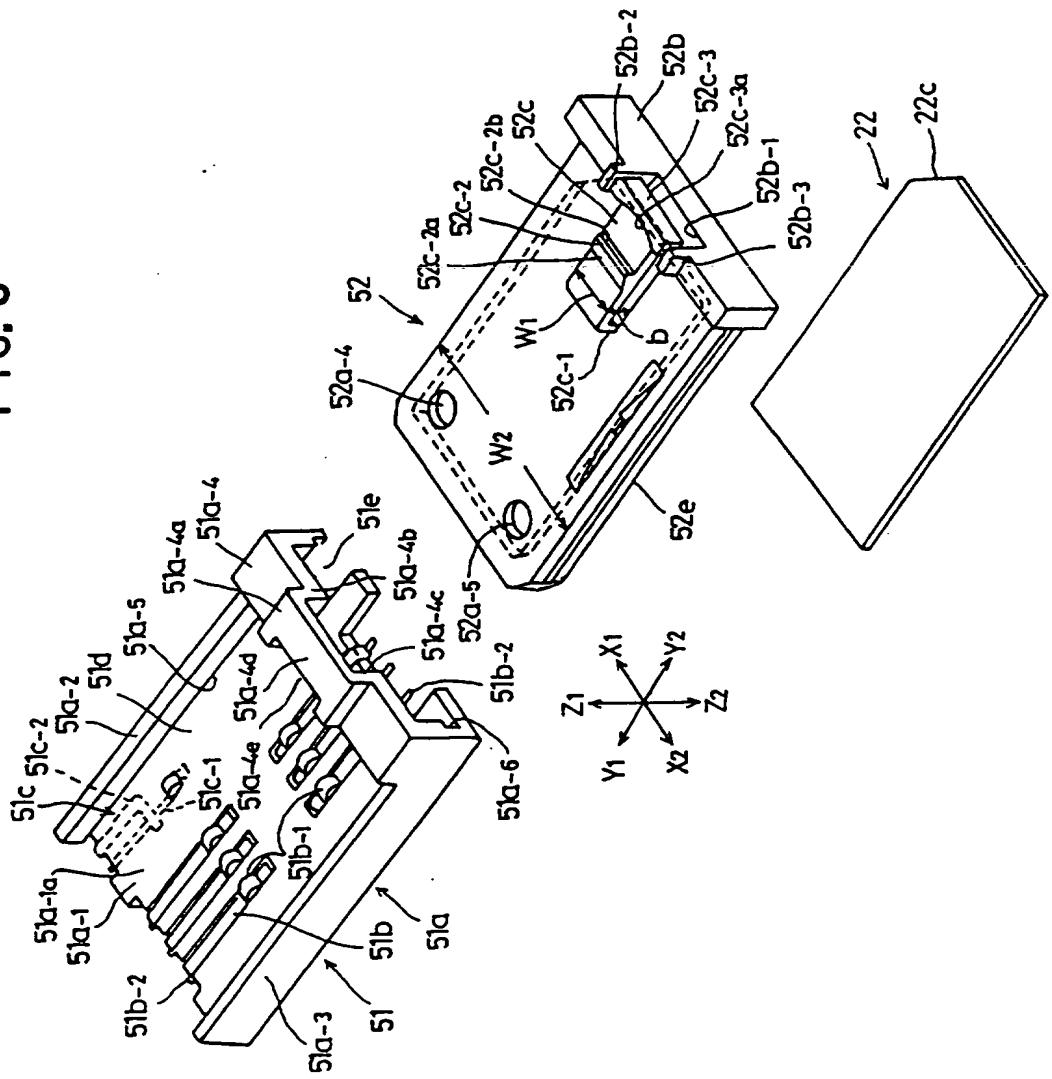


FIG. 6

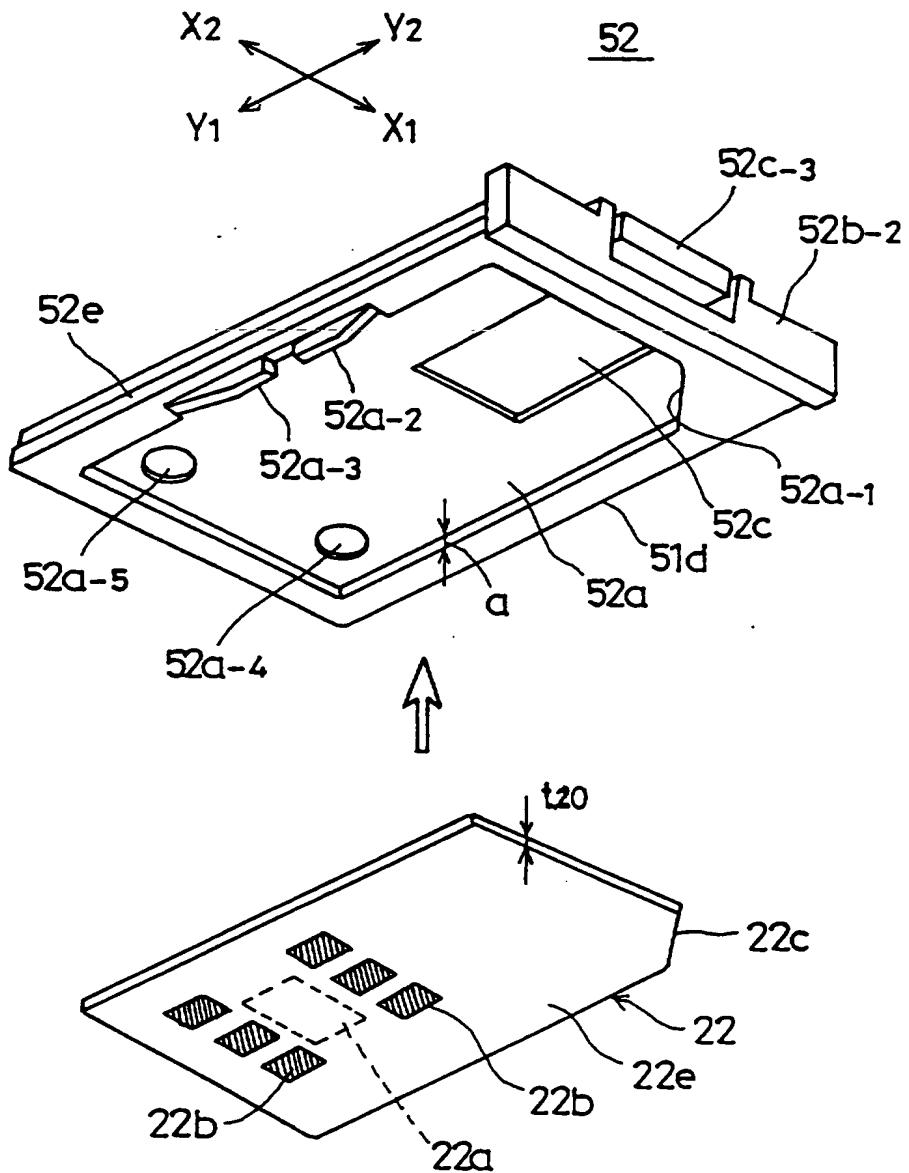


FIG. 7A

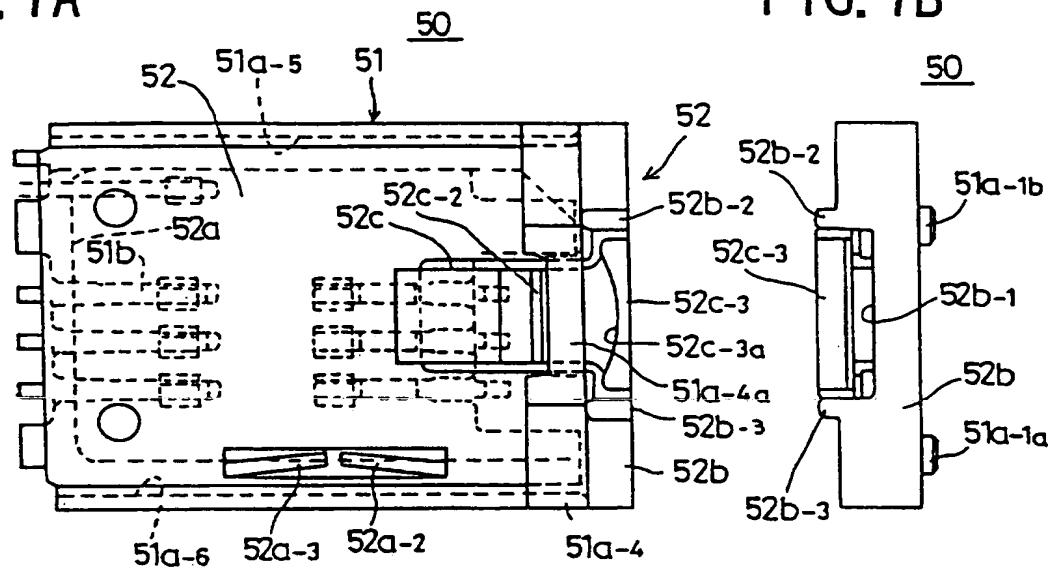


FIG. 7B

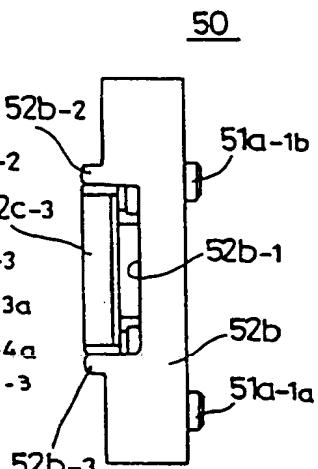


FIG. 7C

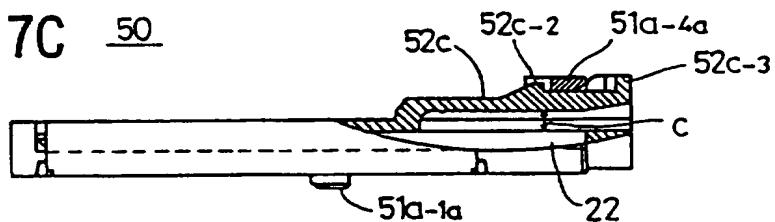


FIG. 7D

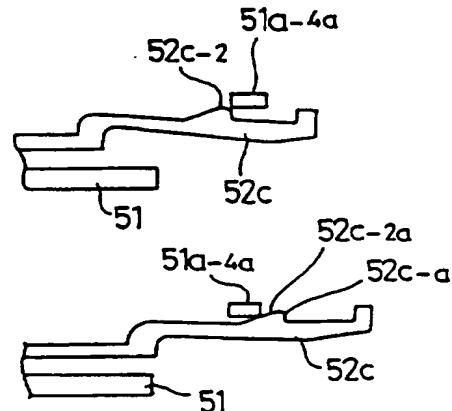


FIG. 7E

FIG. 8A

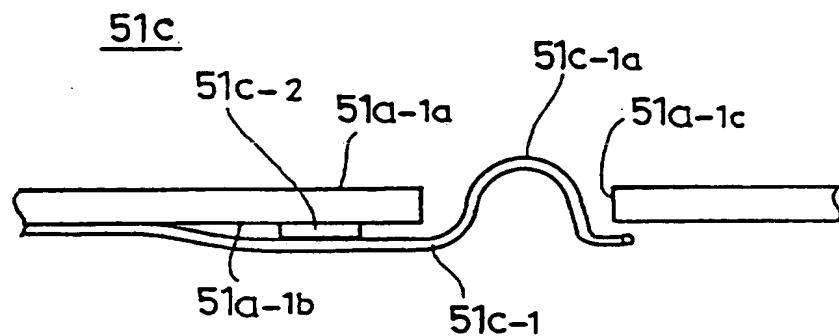
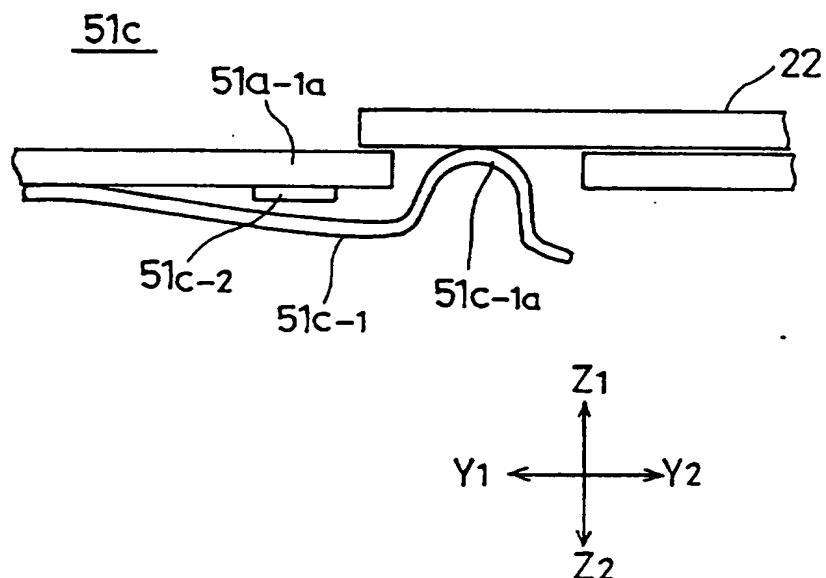
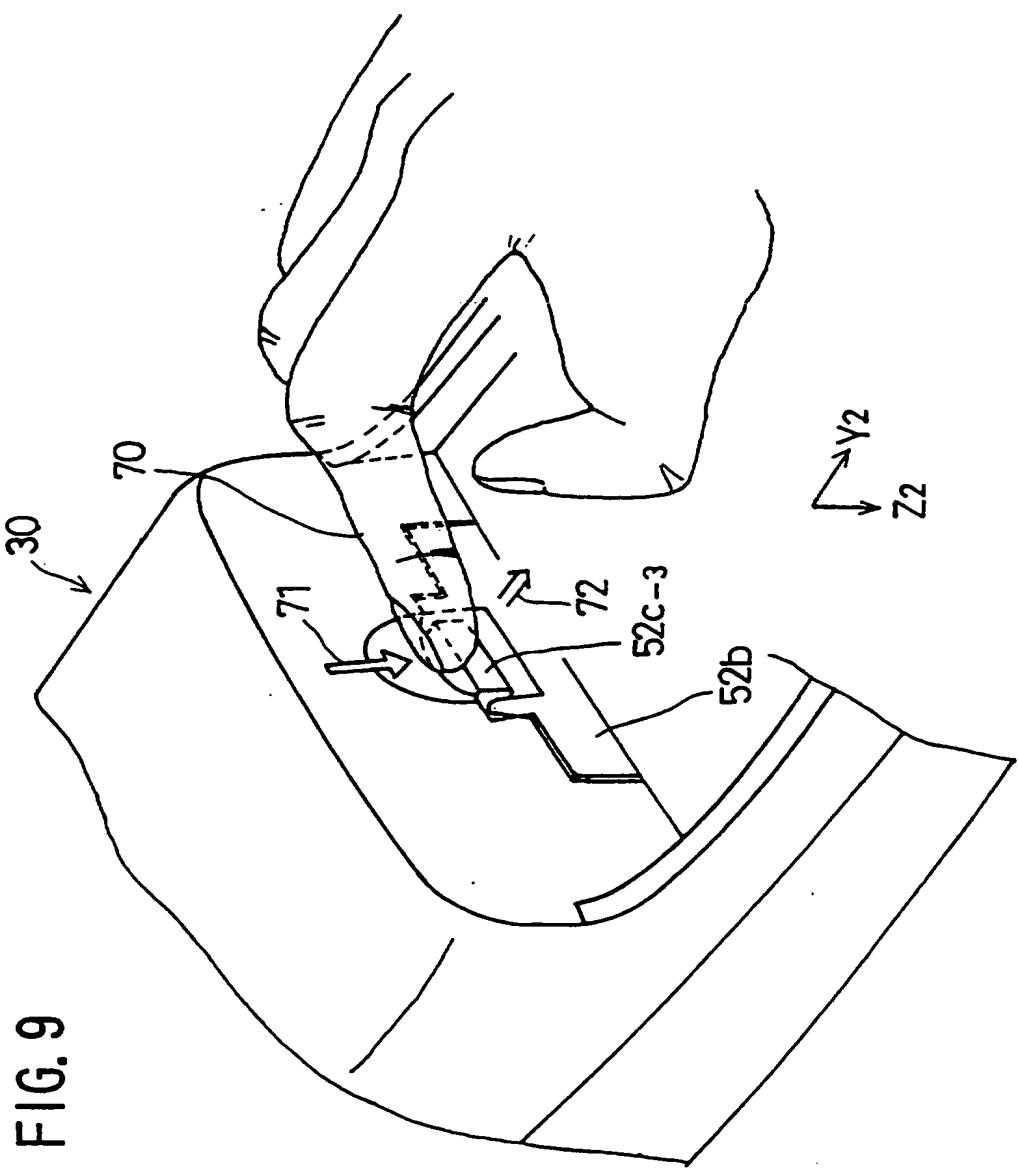


FIG. 8B





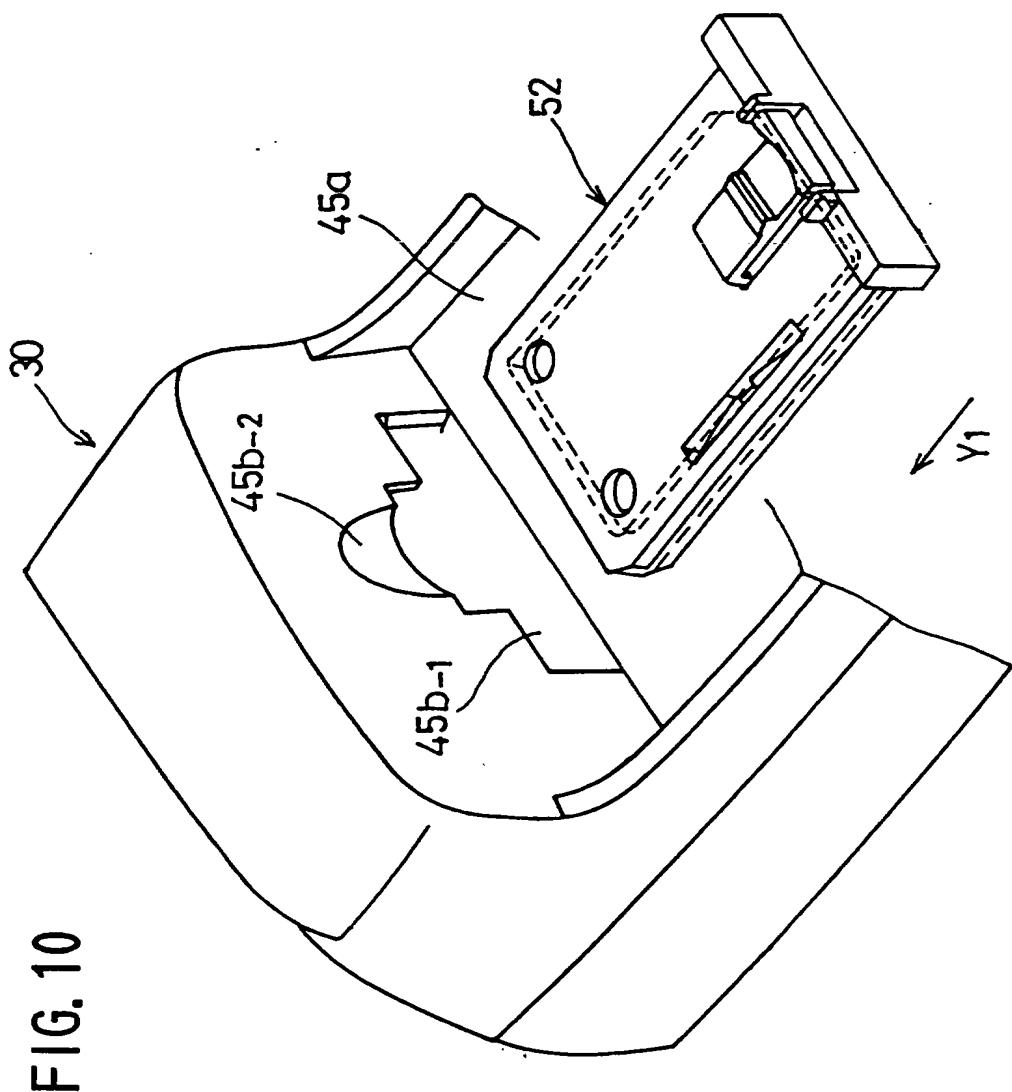


FIG. 11A

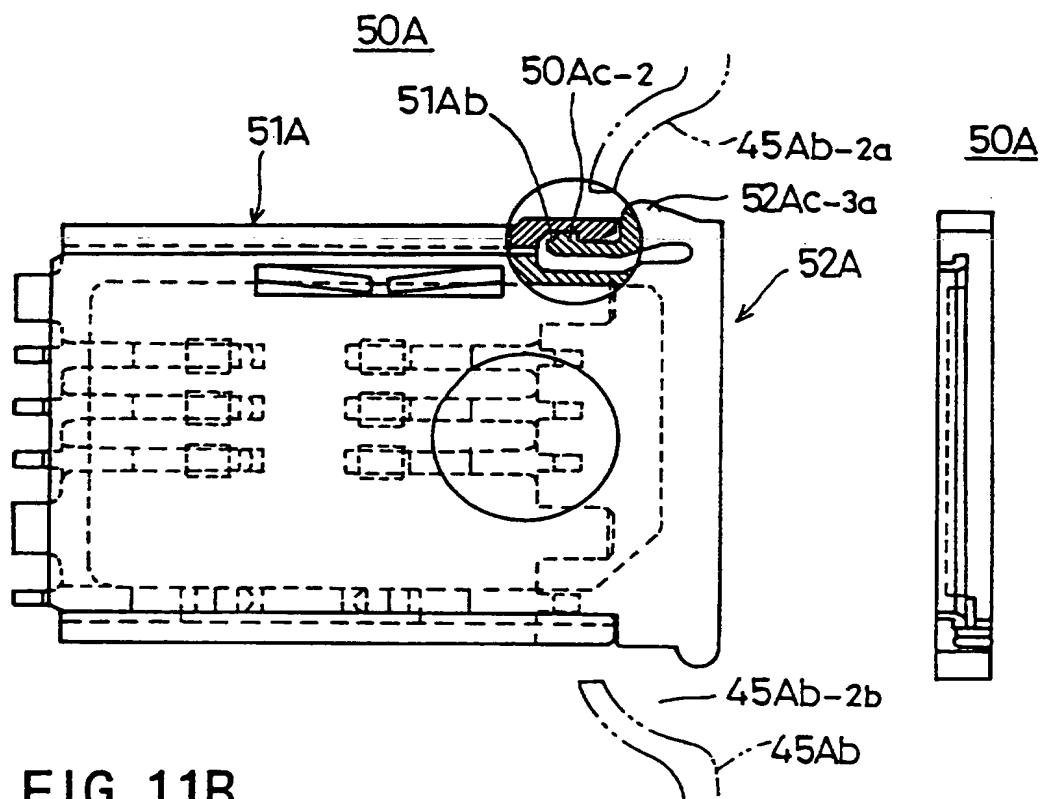


FIG. 11C



FIG. 11B

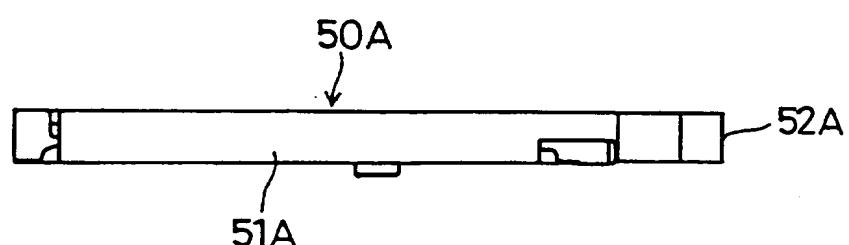


FIG. 12

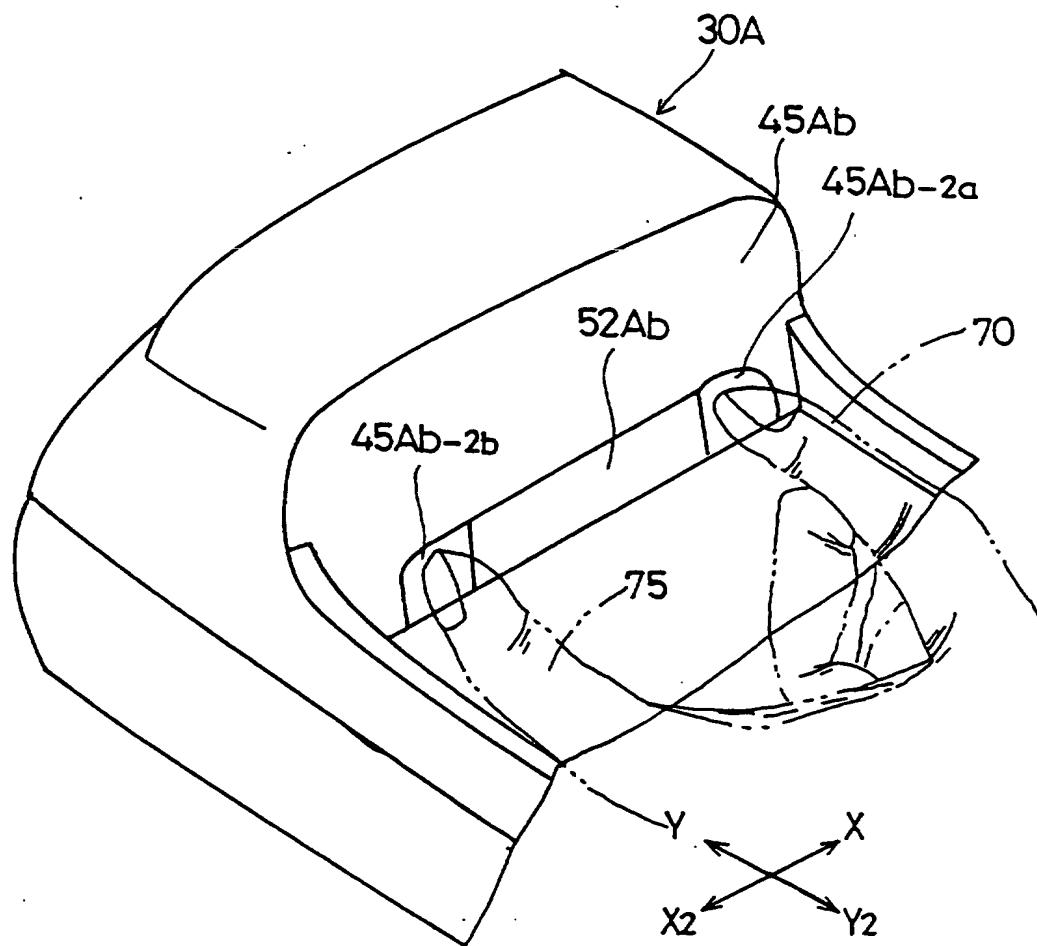


FIG. 13A

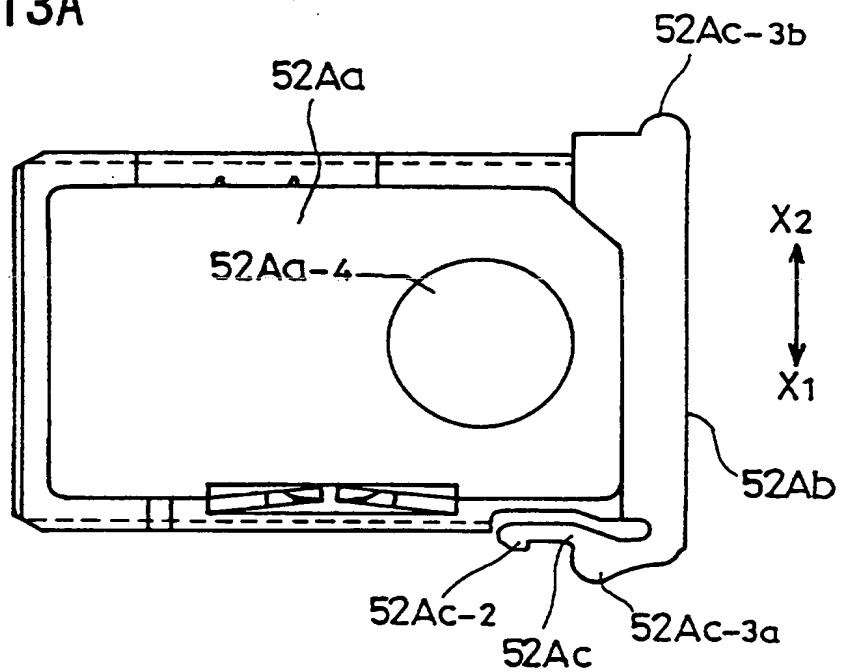


FIG. 13B

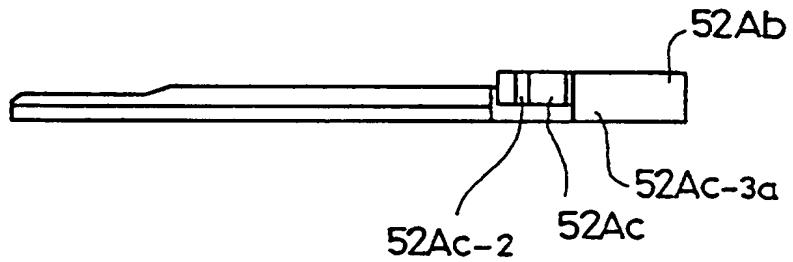


FIG. 14A

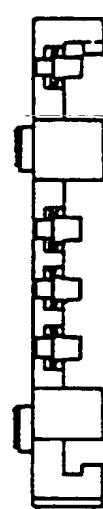


FIG. 14B

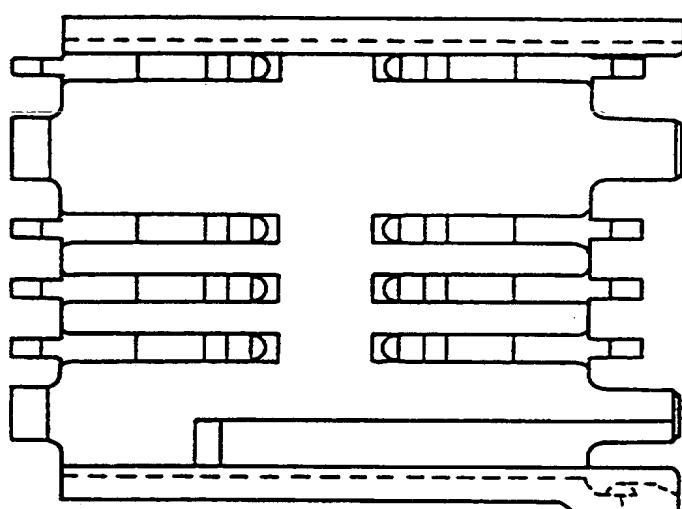


FIG. 14C

51A

51Ap

51A

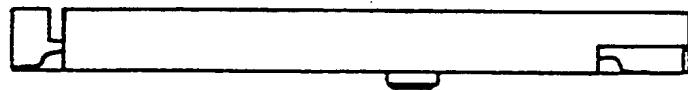


FIG. 15A

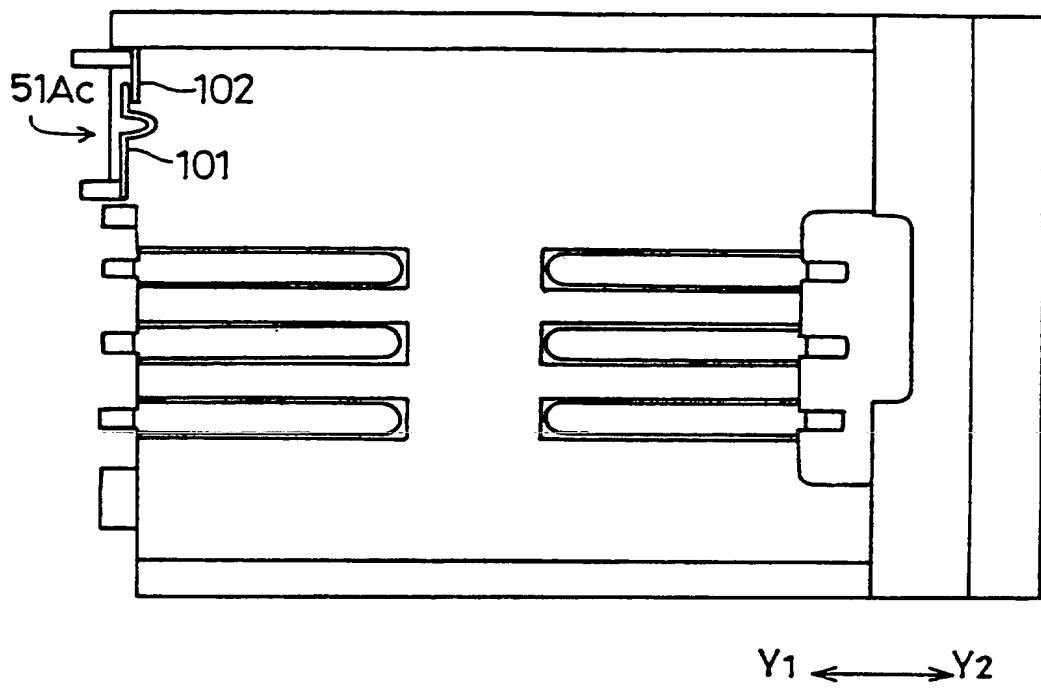


FIG. 15B

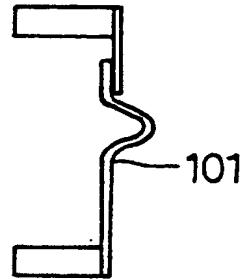
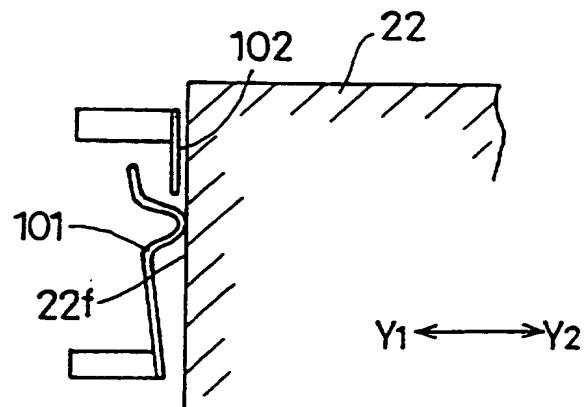


FIG. 15C



1 "PORTABLE TELEPHONE SET"

5 The present invention relates to portable telephone sets, and more particularly to a portable telephone set suitable for a global system for mobile communication (GSM).

10 Recently, it has been considered in Japan to employ, as a communication system using portable telephone sets, the GSM which has been employed in Europe. The GSM does not require registration of a telephone number for each portable telephone set. Each individual (subscriber) is assigned to a subscriber identity module in which information concerning the subscriber is stored. If the 15 subscriber exchanges the old portable telephone set by a new one, the subscriber identity module is detached from the old telephone set and is then inserted into the new one. If the rent portable telephone set is used, the subscriber inserts the own subscriber 20 identity module into the set. Thus, the new or rent portable telephone set can be used as the subscriber own portable telephone set.

25 It has been considered that the subscriber identity module is realized by a compact subscriber identity card in which an integrated circuit including a memory is built. Such a card has a size of, for instance, 25 mm x 15 mm.

30 The portable telephone set has been required to be thin and have a structure which enables the subscriber identity card to be easily detached therefrom.

35 There is another card which can be inserted into the portable telephone set. Such a card stores information important to the subscriber, such as subscriber identity information and accounting information. It is not desired to easily detach, from the portable telephone set, the information cards

1       suitable for the portable telephone set as described  
above in terms of privacy protection. The portable  
telephone set is required to satisfy the above.

5       In the present specification, the cards to  
be attached to the portable telephone sets are  
referred to as portable telephone information cards.  
The portable telephone information cards include the  
above subscriber identity card, and another card which  
stores information other than the subscriber identity  
10      information.

15      Figs. 1A and 1B are diagrams of a portable  
telephone set 10 for the GSM disclosed in Japanese  
Laid-Open Patent Application No. 8-265404. A battery  
pack 11 can be attached to the back surface of the  
portable telephone set 10. A card loading mechanism  
12 is provided in a bottom surface portion of a  
battery pack mount portion 13 provided to the back  
surface of the portable telephone set 10, that is, the  
back surface of the mounted battery pack 11. The  
20      battery pack mount portion 14 has a bottom plate 14,  
in which a rectangular opening 15 is formed.

25      The subscriber identity card loading  
mechanism 12 is mainly composed of a housing 20 and a  
holder 21. The housing 20 is fixed to the inside of  
the portable telephone set 10, and faces the opening  
15. The holder 21 is joined to the housing by a  
hinge.

30      A subscriber identity card 22 can be mounted  
as follows. The holder 21 is rotated and set upright.  
Then, the subscriber identity card 22 is inserted into  
the holder 21, which is then depressed and rotated.  
Thus, the card 22 passes through the opening 15 and is  
engaged with the housing 20.

35      The subscriber identity card 22 can be taken  
out by the reverse operation. It should be noted that  
the subscriber identity card 22 which is mounted  
cannot be taken out unless the battery pack 11 is

1      taken out.

The above portable telephone set 10 has the following problems.

5      The battery pack mount portion 13 located in the back surface of the portable telephone set 10 includes a slight recess. A circuit board, a tenkey and other components are tightly provided in a portion 16 opposite to the battery pack mount portion 13. Thus, no space is available in which a new mechanism 10 is provided. The card loading mechanism 12 is provided in the above portion 16, and thus has an increased thickness  $t_1$ . Hence, the thickness  $t_3$  of the portable telephone set 10 is equal to the sum of the thickness  $t_2$  necessary to provide the circuit 15 board, the tenkey and other components and the thickness  $t_1$  of the card loading mechanism 12. The thickness  $t_3$  prevents down-sizing of the portable telephone set 10.

20     The holder 21 cannot be detached from the housing 20. Hence, it is necessary to take the portable telephone 10 by hand in order to take out the subscriber identity card 22 from the holder 21 and insert the subscriber identity card 22 into the holder 21. The above is troublesome. Further, the card 25 loading mechanism 12 has a complex structure.

A detection switch detects the holder 21 even when the holder 21 having no card is mounted. Hence, if the subscriber dials with no card inserted into the holder 21, the portable telephone set 10 30 starts a corresponding calling procedure although it is not completed.

It is a general object of the present invention to provide a portable telephone set in which the above disadvantages are eliminated.

35     A more specific object of the present invention is to provide a compact portable telephone set having a simplified card loading mechanism.

1                   The above objects of the present invention  
are achieved by a portable telephone set comprising: a  
case having first and second sides opposite to each  
other; a group of keys located on the first side of  
5                   the case; and a card loading mechanism. The case  
includes first and second portions located on the  
second side. The first portion can accommodate a  
battery pack, and the second portion is next to the  
first portion and accommodates the card loading  
10                  mechanism. A card in which information is stored can  
be loaded to the card loading mechanism. The card  
loading mechanism and the battery pack can be arranged  
side by side, so that the thickness of the portable  
telephone set can be reduced.

15                  The above portable telephone set may be  
configured so that: the case has a wall interposed  
between the first and second portions; and the wall  
has an opening through which the card can be inserted  
20                  into the second portion and loaded to the card loading  
mechanism. Hence, the card cannot be detached unless  
the battery pack is detached. Thus, it is possible to  
prevent the card from happening to be detached from  
the portable telephone set.

25                  The portable telephone set may be configured  
so that the second portion includes a protrusion with  
respect to a bottom portion of the first portion.  
Such a protrusion means that there is a comparatively  
large spatial area in the portable telephone set.  
Hence, the card loading mechanism can be provided in  
30                  the second portion without a particular difficulty.

35                  The portable telephone set may be configured  
so that the card loading mechanism comprises: a  
housing located in the second portion; and a card  
holder having a card accommodating portion in which  
the card can be accommodated, the card holder having a  
spring portion which portion has a handle portion with  
which a finger can be engaged, and an engagement crav

1 which can engage with a part of the housing when the  
card holder is inserted into the housing. A simple  
structure of the card loading mechanism can be  
realized.

5 The portable telephone set may be configured  
so that the spring portion is formed of a resin.  
Thus, the spring portion having a resilient property  
can be realized with ease.

10 The portable telephone set may be configured  
so that: the spring portion is formed of a resin and  
can be resiliently bent in a thickness direction of  
the portable telephone set; and the handle portion is  
located in a free end of the spring portion. The card  
holder can easily be drawn by a single-finger  
15 operation.

20 The portable telephone set may be configured  
so that: the spring portion is formed of a resin and  
can be resiliently bent in a thickness direction of  
the portable telephone set; the handle portion is  
located in a free end of the spring portion; and the  
card holder has another handle portion located  
opposite to the handle portion. The card holder can  
easily be drawn by using two fingers such as the thumb  
finger and the forefinger.

25 The portable telephone set may be configured  
so that: the card holder has a card holding portion  
having a spring property and projecting from a side of  
the card accommodating portion; and the card holding  
portion engages with a part of the card so that the  
30 card can be restricted in the second portion. The  
card holding portion of the card holder can certainly  
hold the card.

35 The portable telephone set may be configured  
so that the card loading mechanism comprises: a  
housing located in the second portion; a card holder  
having a card accommodating portion in which the card  
can be accommodated; and a detection switch which

1      detects a situation in which the card holder with the  
card loaded thereto is inserted into the housing.  
Hence, even if the card holder with no card  
accommodated therein is loaded to the portable  
5      telephone set, the portable telephone set can be  
prevented from performing a meaningless or wasteful  
operation such as a calling procedure.

10     The portable telephone set may be configured  
so that the detection switch has a terminal having a  
spring property, the terminal which can be engaged  
with the card accommodated in the card holder. The  
same advantages as described above can be obtained.

15     The portable telephone set may be configured  
so that the card holder has a spring portion which  
portion has a handle portion with which a finger can  
be engaged, and an engagement claw which can engage  
with a part of the housing when the card holder is  
inserted into the housing. The card holding portion  
of the card holder can certainly hold the card.

20     The portable telephone set may be configured  
so that the card loading mechanism can receive the  
card in a state in which the battery pack is detached  
from the first portion. Hence, the card can be  
prevented from being drawn in the state in which the  
25     battery pack is attached to the portable telephone  
set.

30     Other objects, features and advantages of  
the present invention will become more apparent from  
the following detailed description when read in  
conjunction with the accompanying drawings, in which:

    Figs. 1A and 1B are diagrams of a  
conventional portable telephone set;

35     Fig. 2A is a partially-cutout plan view of a  
portable telephone set according to an embodiment of  
the present invention;

    Fig. 2B is a cross-sectional view of the  
portable telephone set shown in Fig. 2A;

1                   Fig. 3 is an exploded perspective view of  
the portable telephone set shown in Figs. 2A and 2B;

5                   Fig. 4 is an enlarged perspective view taken  
along an arrow III shown in Fig. 2B;

10                  Fig. 5 is a perspective view of a subscriber  
identity card loading mechanism of the portable  
telephone set;

15                  Fig. 6 is a perspective view of a card  
holder of the portable telephone set;

20                  Figs. 7A, 7B, 7C, 7D and 7E are diagrams of  
the subscriber identity card holding mechanism to  
which a card is loaded;

25                  Figs. 8A and 8B are diagrams of a detection  
switch built in the portable telephone set;

30                  Fig. 9 is an enlarged perspective view  
showing an operation of drawing the card holder from  
the portable telephone set;

35                  Fig. 10 is an enlarged perspective view  
showing an operation of loading the card holder

40                  Figs. 11A, 11B and 11C show another  
subscriber identity loading mechanism;

45                  Fig. 12 is an enlarged perspective view of a  
state in which the subscriber identity card loading  
mechanism is installed in the portable telephone set;

50                  Figs. 13A and 13B are diagrams of a card  
holder;

55                  Figs. 14A, 14B and 14C are diagrams of a  
housing; and

60                  Figs. 15A, 15B and 15C are diagrams of  
another detection switch.

65                  Figs. 2A and 2B are diagrams of a portable  
telephone set 30 which can be applied to the GSM  
according to an embodiment of the present invention.  
Further, Fig. 3 is an exploded perspective view of the  
70                  portable telephone set 30. Fig. 4 is an enlarged  
perspective view taken along arrow III shown in Fig.  
75                  2B.

1                   The portable telephone set 30 has a front  
case 32 and a back case 34 between which a printed  
wiring board unit 36 is interposed. The whole case of  
the portable telephone set 30 includes the cases 32  
5                   and 34. The front case 32 is equipped with a key  
group sheet 31 on which a plurality of keys are  
arranged. The back case 34 is equipped with an  
antenna 37. The printed wiring board unit 36 is  
equipped with a liquid crystal unit 35. The front  
10                  case 32, the rear case and the printed wiring board  
unit 36 are longitudinal in directions Y1 and Y2. A  
housing 51, which will be described in detail later,  
is attached to the printed wiring board unit 36. The  
portable telephone set 30 has a front surface facing  
15                  in a direction Z1, and a back surface facing in a  
direction Z2.

20                  A plurality of keys 39 are arranged in a  
front surface 30a of the portable telephone set 30 so  
that the keys 39 occupy an area located in a direction  
Y2 with respect to the center in the longitudinal  
direction. A display window 40 of the liquid crystal  
unit 35 and an acoustic output part 41 formed of a  
speaker are provided in an area located in a direction  
Y1 with respect to the keys 39. An acoustic output  
25                  part 42 formed of a microphone is provided in the area  
located in the direction Y2 with respect to the key  
39.

30                  A battery pack mounting portion 45 is  
provided to the back surface 30b of the portable  
telephone set 30 and is located in the area extending  
in the direction Y2 from the center in the  
longitudinal direction. In other words, the battery  
pack mounting portion 45 is located in the portion  
corresponding to the arrangement of the keys 39. A  
35                  battery pack 46 having a length approximately equal to  
half the length of the portable telephone set 30 is  
mounted on the battery pack mounting portion 45. The

- 1      battery pack mounting portion 45 has a recess which causes the back surface 30b of the portable telephone set 30 with the battery pack 46 mounted to be a flat surface. A portion 47, which is adjacent to the
- 5      battery pack mounting portion 45 in the longitudinal direction and totally occupies the whole located in the direction Y1 with respect to the battery pack mounting portion 45, has a projection projecting from a bottom surface 45a in the direction Z1.
- 10     Hereinafter, the portion 47 will be referred to as a battery pack mount adjacent portion. The interface between the battery pack mounting portion 45 and the battery pack adjacent portion 47 is a vertical wall 45b which stands upright in the direction Z1 from the
- 15     bottom surface 45a. A card holder inserting opening 45-b is formed in a lower end portion of the vertical wall 45b. The lower side of the vertical wall 45b corresponds to the position in which the card holder insertion opening 45-b is formed. Hence, as will be
- 20     described in detail later with reference to Fig. 10, when the card holder 52 is placed on the bottom surface 45a of the battery pack mounting portion 45 of the portable telephone set 30, the card holder 52 faces the card holder insertion opening 45-b.
- 25     The portable telephone set 30 has a subscriber identity card loading mechanism 50, which is provided in an inner space 47a of the battery pack mount adjacent portion 47. The mechanism 50 is built in the portable telephone set 30 without any increase
- 30     in the thickness thereof because the battery pack mount adjacent portion 47 projects from the bottom surface 45a of the battery pack mounting portion 45, and is located in the area which has a larger spatial margin than the other area of the portable telephone set 30. Further, the size of the card loading mechanism 50 itself is small. The thickness of the portable telephone set 30, which is denoted as t10, is

1 equal to that obtained when the card loading mechanism  
50 is not installed.

5 A description will be given, with reference  
to Figs. 5, 6 and 7A through 7E, of the structure of  
the subscriber identity card loading mechanism 50.

10 The card loading mechanism 50 includes the  
housing 51 and the card holder 52 which holds the  
subscriber identity card 22 and is attached to the  
housing 51. The card loading mechanism 50 has an  
upper surface facing in the direction Z1, a lower  
surface in the direction Z2, a front surface in the  
direction Y2, and a rear portion in the direction Y1.  
The width of the mechanism 50 extends in the  
directions X1 and X2.

15 As shown in Fig. 6, the subscriber identity  
card 22 includes a built-in integrated circuit 22a and  
six electrodes 22b provided to the lower surface of  
the card 22. Further, the subscriber identity card 22  
has a chamfered corner 22c.

20 The card holder 52 is a synthetic resin  
molded component, and has a flat shape which is long  
in the directions Y1 and Y2. The card holder 52  
includes a subscriber identity card accommodating  
portion 52a provided to the lower surface side, a  
25 front panel portion 52b, and a cantilever plate spring  
52c provided to the upper surface side. Further, the  
card holder 52 has rail portions 52d and 52e which are  
provided to ends thereof located in the directions X1  
and X2 and extend in the directions Y1 and Y2.

30 The subscriber identity card accommodating  
portion 52a has a size which corresponds to the  
subscriber identity card 22, and a depth "a"  
corresponding to the thickness  $t_{20}$  of the card 22 so  
that the card accommodating portion 52a has a flat  
35 recess shape into which the subscriber identity card  
can be accommodated. The card accommodating portion  
52a includes a slant portion 52a-1, which corresponds

1 to the chamfered corner 22a. Two plate springs 52a-2  
and 52a-3 made of synthetic resin are provided to the  
end X2 of the card accommodating portion 52a so that  
the free ends thereof face each other and are arranged  
5 in a line in the directions Y1 and Y2. The plate  
springs 52a-2 and 52a-3 can be resiliently bent in the  
direction X2. The plate springs 52a-2 and 52a-3  
function as subscriber identity card holding portions  
having a spring property. Further, holes 52a-4 and  
10 52-5 for pushing out the subscriber identity card are  
formed in the vicinity of the ends of the bottom of  
the card accommodating portion 52a in the direction  
Y1.

The front panel portion 52b has a U-shaped  
15 cutout portion 52b-1 located at the center thereof.  
Protrusions 52b-2 and 52b-3 which protrude in the  
direction Z1 are provided on both sides of the U-  
shaped cutout portion 52b-1. The U-shaped cutout  
portion 52b-1 functions to accommodate a handle  
20 portion 52c-3 which will be described in detail later.  
The protrusions 52b-2 and 52b-3 come into contact with  
a counter U-shaped frame portion 51a-4a which will  
also be described later.

The cantilever plate spring 52c is  
25 integrally formed when molding the card holder 52, and  
is formed so that a portion of the upper surface of  
the card holder 52 in the width direction (in the  
directions X1 and X2) is cut and raised. The plate  
spring 52c has a width W1 that is approximately equal  
30 to 1/4 of the width W2 of the card holder 52. The  
plate spring 52c has a root portion 52c-1 located in  
the center of the card holder 52 in the directions Y1  
and Y2. The root portion 52c-1 stands upright by a  
distance "b" so that the remaining portion of the  
35 plate spring 52c horizontally extends to the front  
panel portion 52b in the direction Y2. The cantilever  
plate spring 52c has an engagement crav 52c-2 that is

1 located in the center of the upper surface thereof and  
2 projects in the direction Z1. Further, the cantilever  
3 plate spring 52c has the handle portion 52c-3 located  
4 at the end thereof. The engagement craw 52c-2 has a  
5 slant surface 52c-2a in the direction Y1, and a  
6 vertical surface 52c-2b in the direction Y2. The  
7 handle portion 52c-3 has a recess portion 52c-3a on  
8 the upper surface oriented in the direction Y1. The  
9 recess portion 52c-3a makes it possible for the end of  
10 the forefinger of the hand of the operator to be  
11 easily engaged with the handle 52c-3. Further, the  
12 handle portion 52c-3 is located in the U-shaped cutout  
13 portion 52b-1 of the front panel portion 52b.

14 When the handle portion 52c-3 is pushed in  
15 the direction Z2, the cantilever plate spring 52c is  
16 bent and the engagement craw 52c-2 is thus displaced  
17 in the direction Z2. The cantilever plate spring 52c  
18 is located over the upper surface of the card holder  
19 52 by the distance "b". Hence, even if the spring  
20 portion 52c is bent, it is not entered into the  
21 subscriber identity card accommodating portion 52a.

22 The housing 51 includes a housing main body  
23 51a made of synthetic resin, a plurality of terminals  
24 51b fixed to the housing main body 51a, and a  
25 detection switch 51c provided to the housing main body  
26 51a. The housing 51 has a size greater than the card  
27 holder 52.

28 The housing main body 51a includes a bottom  
29 plate portion 51a-1, sidewall portions 51a-2 and 51a-  
30 3, and a counter U-shaped frame portion 51a-4. The  
31 sidewall portions 51a-2 and 52-3 which are located on  
32 both the sides of the housing main body 51a in the  
33 directions X1 and X2 and extend upwards in the  
34 direction Z1. The counter frame portion 51a-4 are  
35 located on both the sides in the direction Y2. Guide  
36 grooves 51a-5 and 51-6 are formed in the parts of the  
37 sidewall portions 51a-2 and 51a-3 which face the

1 bottom plate portion 51a-1. A guard holder  
2 accommodating portion 51d is formed on the upper  
3 surface side of the bottom plate portion 51a-1. The  
4 guard holder accommodating portion 51d has a flat  
5 space partitioned by the sidewall portions 51a-2 and  
6 51a-3. The counter U-shaped frame portion 51a-4 forms  
7 an entrance 51e to the card holder accommodating  
8 portion 51d. Two bosses 51a-1a and 51a-1b for  
9 defining the attachment position of the housing 51 are  
10 formed on the lower surface of the bottom plate  
portion 51a-1.

11 The counter U-shaped frame portion 51a-4  
12 includes a central counter U-shaped frame portion 51a-  
13 4a, which is a step portion higher than the frame  
14 portion 51a-4. The portion 51a-4a is provided to  
15 allow the cantilever plate spring 52c of the card  
16 holder 52 to pass therethrough. Two upright portions  
17 51a-4b and 51a-4c located on both sides of the frame  
18 portion 51a-4a receive the protrusions 52b-2 and 52b-3  
19 when the card holder 52 is inserted. A cut portion  
20 51a-4e having a U shape corresponding to the size of  
21 the engagement craw 52c-2 is formed in an end of the  
22 frame portion 51a-4a extending in the direction Y1.  
23 The frame portion 51a-4d functions as an engagement  
24 portion with which the engagement craw 52c-2 is  
25 engaged.

26 The six terminal members 51b are fixed to  
27 the upper surface 51a-1a of the bottom plate portion  
28 51a-1. Arc-shaped terminal portions 51b-1 are  
29 respectively provided on the ends of the six terminal  
30 members 51b so as to correspond to the six electrodes  
31 22b of the subscriber identity card 22. Terminal  
32 portions 51b-2 provided on the other ends of the six  
33 terminal members 51b extend outwards from the ends in  
34 the directions Y1 and Y2. The terminal portions 51b-2  
35 have the same height as that of the lower surface 51a-  
1b of the bottom plate portion 51a-1.

1                   Referring to Fig. 8A additionally, the  
detection switch 51c has a first contact member 51c-1  
and an L-shaped second contact member 51c-2, and is  
normally closed. The first contact member 51c-1 and  
5                   the second contact member 51c-2 are fixed to the lower  
surface 51a-1b of the bottom plate portion 51a-1. The  
first contact member 51c-1 has one end located in the  
direction Y1, which end is fixed, while the other end  
thereof can flexibly be bent. The first contact 51c-1  
10                  has a convex portion 51c-1a protruding in the  
direction Z1. More particularly, the convex portion  
51c-1a slightly protrudes from the upper surface 51a-  
1a of the bottom plate portion 51a-1 via an opening  
window 51a-1c of the bottom plate portion 51a-1. The  
15                  opening window 51a-1c (the convex portion 51c-1a) is  
disposed in a position in which the opening window  
51a-1c is pushed by the subscriber identity card 22  
held in the card holder 52 when the card holder 52 is  
inserted into the housing 51.

20                  When the subscriber identity card 22 is not  
inserted into the card holder 52, the first contact  
member 51c-1 is in contact with the second contact  
member 51c-2, as shown in Fig. 8A. Hence, the  
detection switch 51c is maintained in the closed  
25                  state.

As shown in Fig. 3, the printed wiring board  
unit 36 has a flexible printed circuit board used to  
attach the housing 51 thereto. The flexible printed  
circuit board 60 extending from the inside of the  
30                  printed wiring board unit 36 is folded and adheres to  
the upper surface of the unit 36. A plurality of  
lands 61 are provided to the flexible printed circuit  
board 60 so as to have an arrangement which  
corresponds to the terminal portions 51b-2. Holes 62  
35                  are formed in the upper surface of the unit 36 and the  
board 60 so that the positions of the holes 62  
correspond to those of the bosses 51a-1a and 51a-1b.

1           The housing 51 is positioned so that the  
bosses 51a-1a and 51a-1b are engaged with the holes  
62. The terminal portions 51b-2 are soldered to the  
lands 61. Then, the housing 51 is mounted on the  
5           upper surface of the printed wiring board unit 36 so  
that the entrance 51e is oriented along the direction  
Y2.

10           The housing 51 can completely be  
accommodated in the battery pack mount adjacent  
portion 47, and the entrance 51e faces a card holder  
insertion opening 45b-1 of the vertical wall 45b in  
the state in which the printed wiring board unit 36 is  
covered by the front case 32 and the back case 34.

15           As shown in Fig. 4, a finger inserting  
recess portion 45b-2 is formed in the vertical wall  
45b in addition to the card holder insertion opening  
45b-1, which opening has a shape corresponding to the  
front panel portion 52b of the card holder 52. The  
finger inserting recess portion 45b-2 makes it easy  
20           for the forefinger of the operator to engage with the  
handle portion 52c-3. The finger inserting recess  
portion 45b-2 is located just above the card holder  
insertion opening 45b-1, and is recessed in the  
direction Y1 so that the degree of recess is increased  
25           in the direction Z2.

30           In the state in which the card holder 52 is  
accommodated in the housing 51, as shown in Fig. 4,  
the front panel portion 52b is stayed in the card  
holder insertion opening 45b-1, and the handle portion  
52c-3 projects from the lower end of the finger  
inserting recess portion 45b-2.

35           Next, a description will be given of a  
procedure and operation to be carried out when the  
operator who rents a portable telephone set inserts  
his or her own subscriber identity card 22 therein.

              The above procedure is comprised of the  
following first to fifth steps. The first step is to

1 detach the battery pack 46 from the portable telephone  
set 30. The second step is to take out the card  
holder 52 having no card. The third step is to insert  
the own subscriber identity card 22 into the card  
5 holder 52. The fourth step is to load the card holder  
52 with the card 22 inserted therein to the housing  
51. The fifth step is to attach the battery pack 46.

The above first to fifth steps will be  
described in more detail below.

10 In the first step, the battery pack 46 is  
detached from the portable telephone set 30. Hence,  
as shown in Fig. 4, the handle portion 52c-3 is  
exposed.

15 In the second step, the card holder 52  
having no card is drawn and taken out. As shown in  
Fig. 9, a forefinger 70 is inserted into the finger  
insertion recess portion 45b-2. Then, as indicated by  
an arrow 71, the handle portion 52c-3 is pressed in  
the direction Z2, and is thereafter drawn in the  
20 direction Y2 as indicated as indicated by an arrow 72.  
In the operation of pressing the handle portion 52c-3  
in the direction Z2, as shown in Fig. 7D, the  
cantilever plate spring 52c is bent in the direction  
Z2, and the engagement craw 52c-2 is disengaged from  
25 the central counter U-shaped frame portion 51a-4a.  
Hence, the card holder 52 is released from the locked  
state in which it is locked to the housing 51. The  
forefinger 70 strongly engages with the recess portion  
52c-3a of the handle portion 52c-3. In the subsequent  
30 operation, the craw portion 52c-2 passes below the  
frame portion 51a-4a, so that the card holder 52 is  
drawn to the outside of the housing 51.

As described above, the card holder 52 can  
be drawn by the operation of only the forefinger.

35 In the third step, the subscriber identity  
card 22 of the operator is inserted in the card holder  
52. The card 22 is lightly pushed in the subscriber

1 identity card accommodating portion 52a in the  
direction reverse to the direction shown in Fig. 6A so  
that the card accommodating portion 52a faces up.  
hence, the plate springs 52a-2 and 52a-3 are  
5 resiliently bent, so that the card 22 is loaded to the  
card holder 52. In this state, the card holder 52 is  
detached from the portable telephone set 30. Hence,  
it is very easy for the operator to load his or her  
own subscriber identity card 22 to the subscriber  
10 identity card accommodating portion 52a.

The card 22 can be correctly loaded to the  
card holder 52 due to the function of the chamfered  
portion 22c of the card 22 and the slant portion 52-1  
of the card accommodating portion 52a. The card 22 is  
15 pushed in the single direction by the plate springs  
52a-2 and 52a-3. Hence, even when the card holder 52  
is turned reversely so that the card accommodating  
portion 52a faces down, the card 22 does not drop off.

In the fourth step, the card holder 52 is  
20 inserted into and loaded to the housing 51.

As shown in Fig. 10, the card holder 52 is  
placed on the bottom surface 45a of the battery pack  
loading portion 45 of the portable telephone set 30 so  
that the card holder 52 faces the card holder  
25 insertion opening 45b-1. Then, the card holder 52 is  
made to slide in the direction Y1 so that it passes  
through the card holder insertion opening 45b-1.  
Hence, the card holder 52 is inserted into the housing  
30 51. When the card holder 52 is placed on the bottom  
surface 45a of the battery pack mounting portion 45,  
the card holder 52 faces the card holder insertion  
opening 45b-1. This arrangement facilitates the  
operation of orienting the card holder 52 toward the  
card holder insertion opening 45b-1, so that the card  
35 holder 52 can easily be loaded to the housing 51.

The card holder 52 is guided and regulated  
in the directions X1, X2, Z1 and Z2 so that the rail

1 portions 52d and 52e engages with the guide grooves  
51a-5 and 51a-6 of the housing 51. As shown in Fig.  
4, the card holder 52 is inserted until the handle  
portion 52c-3 is engaged with the card holder  
5 insertion opening 45b-1.

The card holder 52 is prevented from moving  
in the direction Z1 because the rail portions 52d and  
52e engage with the guide grooves 51a-5 and 51a-6.  
The subscriber identity card 22 is prevented from  
10 moving in the direction Z1 due to the function of the  
card holder 52. Hence, the subscriber identity card  
22 cannot move in the direction Z1.

As shown in Fig. 7E, when the engagement  
craw 52c-2 comes into contact with the central counter  
15 U-shaped frame portion 51a-4a, the slant surface 52c-2  
is guided by the frame portion 51a-4a, and the  
cantilever plate sprint 52c is resiliently bent in the  
direction Z2. Hence, the engagement craw 52c-2 enters  
below the frame portion 51a-4a. In other words, the  
20 card holder 52 can be inserted into the housing 51 by  
merely pushing the card holder 52 in the direction Y2  
rather than specially depressing the handle portion  
52c-3. This also makes it easy to load the card  
holder 52 to the housing 51.

25 When the card holder 52 is inserted into the  
final position of the housing 51, the engagement craw  
52c-2 passes through the central counter U-shaped  
frame portion 51a-4a, and the cantilever plate spring  
52c is resiliently returned to the original state.

30 Further, the vertical surface 52c-2b of the engagement  
craw 52c-2 engages with the frame portion 51a-4a.  
Thus, the card holder 52 is locked to the housing 51  
and is prevented from being detached therefrom.

35 When the card holder 52 is inserted into the  
final position of the housing 51, the six electrodes  
22b of the subscriber identity card 22 come into  
contact with the six arc-shaped terminal portions 51b-

1       1. As shown in Fig. 8B, the lower surface 22e of the  
      subscriber identity card pushes down the convex  
      portion 51c-1a. Hence, the first contact member 51c-1  
      is detached from the second contact member 51c-2 and  
5       the detection switch 51c is opened. Information which  
      indicates that the subscriber identity card 22 has  
      been loaded to the card holder 52 is supplied to a  
      given circuit of the portable telephone set 30. As  
      has been described previously, the subscriber identity  
10      card 22 cannot move in the direction Z1. Hence, the  
      contacts between the electrodes 22b and the terminal  
      portions 51b-1 can be definitely established and the  
      detection switch 51c can be definitely closed.

15      In the fifth step, the battery pack 46 is  
      attached to the portable telephone set 30. In this  
      state, the portable telephone set 30 is switched to a  
      state in which the owner of the subscriber identity  
      card 22 can be identified. Since the detection switch  
      51c is opened, the portable telephone set 30 operates  
20      normally. In the state in which the battery pack 46  
      is attached to the portable telephone set 30, the  
      handle portion 52c-3 is hidden by the battery pack 46.  
      Hence, the subscriber identity card 22 cannot be  
      detached from the portable telephone set 30 in the  
25      state in which the battery pack 46 is attached  
      thereto. As a result, there is no possibility that  
      the subscriber identity card 22 happens to be detached  
      from the portable telephone set 30.

30      The detection switch 51c is closed in the  
      state in which the card holder 52 with no card is  
      loaded to the portable telephone set 30, which is not  
      thus operated. Hence, it is possible to prevent the  
      occurrence of the wasteful calling procedure which is  
      encountered in the prior art.

35      The card holder 52 with the card 22 attached  
      can be detached as described above. As shown in Fig.  
      7C, the cantilever plate spring 52c is located, by a

1 relatively large distance "c", above the upper surface  
of the subscriber identity card 22 loaded to the card  
holder 52. Hence, even if the cantilever plate spring  
52 is bent downwards, it cannot come into contact with  
5 the subscriber identity card 22, and hence the  
engagement craw 52c-2 can be certainly detached from  
the central counter U-shaped frame portion 51a-4a.  
Hence, the subscriber identity card 22 is detached  
from the card holder 52, the card 22 is pushed by a  
10 tip end of a ballpoint pen or the like, which is  
inserted in the hole 52a-4 and/or 52a-5. Hence, the  
subscriber identity card 22 can easily be detached.

A description will now be given of another  
subscriber identity card loading mechanism 50A by  
15 referring to Figs. 11A, 11B, 11C, 12, 13, 14A, 14B and  
14C.

The subscriber card loading mechanism 50A  
includes a housing 51A and a card holder 52A, which  
holds the subscriber identity card 22 and is loaded to  
20 the housing 51A. The subscriber card loading  
mechanism 50A has a structure in which the card holder  
52A has handle portions located on sides X1 and X2.  
The other portions of the card loading mechanism 50A  
are the same as corresponding those of the card  
25 loading mechanism 50.

As shown in Fig. 13A, handle portions 52Ac-  
3A and 52Ac-3b are provided on the sides X1 and X2 of  
a front panel portion 52Ab. The handle portion 52Ac-  
3a is provided to a spring portion 52Ac, which has an  
30 engagement craw 52Ac-2 located at the tip end of the  
spring portion 52Aa. Further, the spring portion 52Aa  
is resiliently bent in the width direction of the  
portable telephone set 30A. The card holder 52A is  
35 inserted so that the rail portions are guided by guide  
grooves of the housing 51A. The engagement craw 52Ac-  
2 engages with a recess portion 51Ab of the housing  
51A.

1                   As shown in Fig. 12, a card holder insertion  
opening 45Ab-1 is formed in a vertical wall 45Ab of a  
battery pack mounting portion 45A of the portable  
telephone set 30A. Further, finger insertion recess  
5                   portions 45Ab-2a and 45Ab-2b are formed on the sides  
X1 and X2 of the card holder insertion opening 45Ab-1.

A thumb finger 75 is inserted into the  
recess portion 45Ab-2b, and the forefinger 70 is  
inserted into a finger insertion opening 45Ab-2ba.

10                  Then, the handle portions 52Ac-3a and 52Ac-3b are  
slightly gripped, and the spring portion 52Ac is bent  
so that the engagement claw 52Ac-2 is drawn from the  
recess portion 51Ap. In this state, the card holder  
52A is drawn in the direction Y2, and is finally  
15                  detached from the housing 51A. In the above manner,  
the card holder 52A can be drawn to the table while  
gripping the handle portions 52Ac-3a and 52Ac-3b  
without gripping again.

20                  The operation steps of the subscriber  
identity card loading mechanism 50A are the same as  
those of the mechanism 50, and a description thereof  
will be omitted.

25                  Figs. 15A, 15B and 15C show a variation of  
the detection switch 51c. A detection switch 51Ac  
shown in these figures includes a first contact member  
101 and a second contact member 102. As shown in  
Figs. 15A and 15B, the detection switch 51Ac is  
normally maintained in the closed state, and is  
located at an end of the subscriber identity card  
30                  loading mechanism 50 in the direction Y1. As shown in  
Fig. 15C, the detection switch 51Ac is pushed by the  
end surface 22f of the subscriber identity card 22  
located in the direction Y1 and is thus opened when  
the card holder with the card 22 loaded thereto is  
35                  loaded to the housing.

The detection switch 51Ac provided in the  
end of the mechanism in the direction Y1 is attractive

1 when the subscriber identity card has a large number  
of electrodes, for example, eight electrodes, and a  
large number of terminal members is required to be  
formed on the bottom of the housing.

5 The above-mentioned embodiments of the  
present invention are directed to the use of the  
subscriber identity card. However, the present  
invention is not limited to the subscriber identity  
card, and includes any card in which information is  
10 stored.

The present invention is not limited to the  
specifically disclosed embodiments, and variations and  
modifications may be made without departing from the  
scope of the present invention.

15

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1      WHAT WE CLAIM IS:

5

1. A portable telephone set comprising:  
a case having first and second sides  
opposite to each other;  
a group of keys located on the first side of  
10 the case; and  
a card loading mechanism,  
the case including first and second portions  
located on the second side,  
the first portion which can accommodate a  
15 battery pack, and the second portion which is next to  
the first portion and accommodates the card loading  
mechanism,  
a card in which information is stored being  
loaded to the card loading mechanism.

20

2. The portable telephone set as claimed in  
25 claim 1, wherein:  
the case has a wall interposed between the  
first and second portions; and  
the wall has an opening through which the  
card can be inserted into the second portion and  
30 loaded to the card loading mechanism.

35            3. The portable telephone set as claimed in  
claim 1, wherein the second portion includes a  
protrusion with respect to a bottom portion of the

1       first portion.

5

4. The portable telephone set as claimed in  
claim 1, wherein the card loading mechanism comprises:  
a housing located in the second portion; and  
a card holder having a card accommodating  
10 portion in which the card can be accommodated,  
the card holder having a spring portion  
which portion has a handle portion with which a finger  
can be engaged, and an engagement claw which can  
engage with a part of the housing when the card holder  
15 is inserted into the housing.

20

5. The portable telephone set as claimed in  
claim 4, wherein the spring portion is formed of a  
resin.

25

6. The portable telephone set as claimed in  
claim 4, wherein:  
the spring portion is formed of a resin and  
30 can be resiliently bent in a thickness direction of  
the portable telephone set; and  
the handle portion is located in a free end  
of the spring portion.

35

1                   7. The portable telephone set as claimed in  
claim 4, wherein:

5                   the spring portion is formed of a resin and  
can be resiliently bent in a thickness direction of  
the portable telephone set;

10                  the handle portion is located in a free end  
of the spring portion; and

15                  the card holder has another handle portion  
located opposite to the handle portion.

10

15                  8. The portable telephone set as claimed in  
claim 4, wherein:

5                   said card holder has a card holding portion  
having a spring property and projecting from a side of  
the card accommodating portion; and

20                  the card holding portion engages with a part  
of the card so that the card can be restricted in the  
second portion.

25

                  9. The portable telephone set as claimed in  
claim 1, wherein the card loading mechanism comprises:

30                  a housing located in the second portion;  
a card holder having a card accommodating  
portion in which the card can be accommodated; and  
a detection switch which detects a situation  
in which the card holder with the card loaded thereto  
is inserted into the housing.

35

1                   10. The portable telephone set as claimed  
in claim 9, wherein the detection switch has a  
terminal having a spring property, said terminal which  
can be engaged with the card accommodated in the card  
5                   holder.

10                  11. The portable telephone set as claimed  
in claim 9, wherein the card holder has a spring  
portion which portion has a handle portion with which  
a finger can be engaged, and an engagement crew which  
can engage with a part of the housing when the card  
15                 holder is inserted into the housing.

20                  12. The portable telephone set as claimed  
in claim 1, wherein the card loading mechanism can  
receive the card in a state in which the battery pack  
is detached from the first portion.

25

30                  13. A portable telephone set as  
hereinbefore described with reference to and as  
illustrated in the accompanying drawings except for  
Figs. 1A and 1B.

35



Application No: GB 9801728.8  
Claims searched: 1-13

Examiner: Catherine Schofield  
Date of search: 24 April 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): H4J (JK), H4L (LECX)

Int Cl (Ed.6): H04B: 1/034, 1/08, 1/38; H04M: 1/02, 1/72

Other: Online:- WPI, JAPIO, IFIPAT

**Documents considered to be relevant:**

Category	Identity of document and relevant passage		Relevant to claims
X, Y	EP 0684723 A2	(SIEMENS)	X:1,4 Y:9,10
X, Y	WO 96/03810 A1	(SIXTEL) - see particularly fig. 10. and page 12, line 8 - page 13 line 3.	X:At least 1 Y:9,10
X, Y	WO 90/13952 A1	(MOTOROLA)	X:1,2,12 Y:9,10
X, Y	US 5465401	(THOMPSON) - particularly fig. 5	X:1 Y:9,10
Y	US 5331123	(KIMBELL & SCHWARTZ) - see column 7, lines 7 - 33	9,10

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.